

(19) World Intellectual Property
Organization
International Bureau



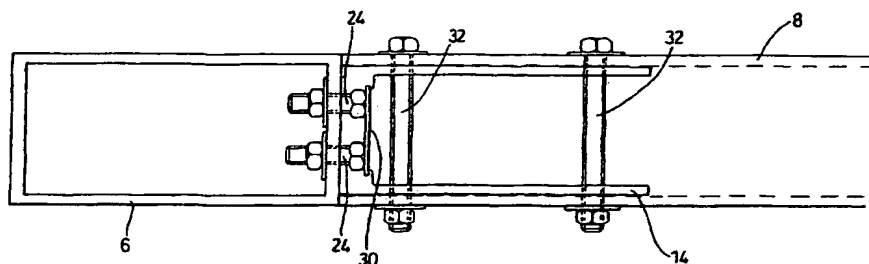
(43) International Publication Date
22 April 2004 (22.04.2004)

PCT

(10) International Publication Number
WO 2004/033811 A1

- (51) International Patent Classification⁷: **E04B 1/24**
- (21) International Application Number:
PCT/GB2003/004270
- (22) International Filing Date: 3 October 2003 (03.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
0223631.3 11 October 2002 (11.10.2002) GB
- (71) Applicant (for all designated States except US): **THE BURNDEN GROUP PLC** [GB/GB]; Burnden Works, Burnden Road, Bolton BL3 2RB (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MCLEAN, Iain** [GB/GB]; Burnden Works, Burnden Road, Bolton BL3 2RB (GB). **BURTON, Tim** [GB/GB]; Burnden Works, Burnden Road, Bolton BL3 2RB (GB).
- (74) Agents: **NEILL, Alastair, William et al.**; Appleyard Lees, 15 Clare Road, Halifax HX1 2HY (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: IMPROVEMENTS IN AND RELATING TO STRUCTURAL SUPPORT SYSTEMS



(57) Abstract: There is provided a structural support system (2) for a conservatory structure, the structural support system comprising a first beam (6), a second beam (8) attached to the first beam (6) by an end thereof and an end plate (14) at least partly closing the end of the second beam (8), with fixing means (24) securing the first beam (6) to the second beam (8) through the end plate (14) thereby to clamp the first beam (6) to the second beam (8).

Improvements in and Relating to Structural Support SystemsField of the Invention

5 The present invention relates to structural support systems for conservatories, to conservatory structures constructed using the same and to methods of construction of structural support systems for conservatories.

10 Background to the Invention

A structural support system can be used in constructing large conservatories that require structural support in addition to that provided by the usual conservatory
15 elements. Where in such a structural support system a hollow rafter beam needs to be attached to a hollow column beam the rafter is mitred to fit and a steel splice plate is located inside and between the rafter and column, and is bolted to both. An elongate slot has to be made in the
20 side wall of the column beam for the splice plate to fit. When so attached the rafter is capable of minor movement relative to the column arising partly from the clearance space around the bolts. This means the eventual structure is less able to cope with external forces.

25

It is an aim of preferred embodiments of the present invention to obviate or overcome a disadvantage of the prior art, whether referred to herein or otherwise.

30 Summary of the Invention

According to the present invention in a first aspect there is provided a structural support system for a conservatory

structure, the structural support system comprising a first beam, a second beam attached to the first beam by an end thereof and an end plate at least partly closing the end of the second beam, with fixing means securing the first beam to the second beam through the end plate thereby to clamp the first beam to the second beam.

By providing an end plate the first and second beams can be squeezed together via the end plate by a clamping action rather than simply loosely locked relative to one another.

Suitably, the end plate comprises means for holding at least one bolt head captive on the interior thereof. Suitably, the means for holding the at least one bolt head captive comprises a slot for receiving a bolt head.

Suitably, the end plate comprises means for retaining at least one bolt in a hole through the end plate. Suitably, the means for retaining at least one bolt comprises a holding plate in a slot in the end plate.

Suitably, the end plate is of generally U-shaped cross section. Suitably, the end plate has an end, a first limb depending therefrom and a second limb depending therefrom. Suitably, the first and second limbs are substantially parallel.

Suitably, the end plate lies substantially within the second beam.

Suitably, the end plate is dimensioned to be a sliding fit in a structural support beam.

Suitably, an end of the second beam is attached to a side of the first beam.

Alternatively, an end of the second beam is attached to an
5 end of the first beam.

Suitably, the end of the second beam is mitred to fit to the first beam at a desired angle.

10 Suitably, the first beam is a column beam and the second beam is a rafter beam.

According to the present invention in a second aspect, there is provided a conservatory structure comprising a
15 structural support system at least part of which is according to the first aspect of the present invention.

According to the present invention in a third aspect, there is provided a method of assembly of at least part of
20 a structural support system, the method comprising the steps of providing a first beam, providing an end plate at the end of a second beam at least partly closing the end of the second plate and securing the first and second beams together via the end plate thereby to clamp the
25 first beam to the second beam.

Suitably, the structural support system is according to the first aspect of the present invention.

30 Suitably, a conservatory element is applied to the structural support system.

Brief Description of the Drawings

The present invention will now be described, by way of example only, with reference to the drawings that follow;
5 in which:

Figure 1 is a schematic perspective illustration of a conservatory structure according to the present invention.

10 Figure 2 is a schematic perspective illustration of a conservatory structure according to the present invention incorporating the structural support system of Figure 1.

Figure 3 is a partly sectional side elevation of a rafter
15 beam connected to a column beam according to the present invention.

Figure 4 is a plan view of the connection shown in Figure 3.

20 Figure 5 is a plan view of an end plate for use with the present invention.

Figure 6 is an end view of the end plate shown in Figure
25 5.

Figure 7 is a functional flow diagram of a method of assembly according to the present invention.

30 Figure 8 is a plan view of another embodiment of the present invention.

Figure 9 is a cross sectional side elevation of a yet further embodiment of the present invention.

Figure 10 is a plan view of an alternative end plate for use with the embodiment shown in Figure 9.

Description of the Preferred Embodiments

Referring to Figure 1 of the drawings that follow, there is shown a structural support system 2 for a conservatory structure, the structural support system comprising vertical hollow column beams 6, hollow rafter beams 8 and a hollow ridge beam 10. Referring to Figure 2 of the drawings that follow, the structural support system 2 at least partly supports conservatory elements 12 such as glazing panels and extruded bars as is well known in the art.

Referring to Figures 3 and 4 of the drawings that follow there is shown one of the column beams 6 attached to one of the rafter beams 8 using an end plate 14, which is shown in Figures 5 and 6 of the drawings that follow. End plate 14 is of a generally U-shaped cross-sectional shape with first and second limbs 16, 18 and a generally rectangular end 20. The rectangular end 20 has four holes 22 therethrough for receiving bolt fixing means 24 (see Figures 3 and 4). On the interior of end plate 14 are recesses 26 aligned with the holes 22 to hold heads of the bolts 24 captive therein to assist in assembly as described below. Aligned slots 28 are provided in the interior of end plate 14 to receive a holding plate 30.

Referring again to Figures 5 and 6 further bolt fixing means 32 are used in the side of rafter beam 8 to secure the end plate 14 thereto.

5 End plate 14 is an aluminium extrusion of substantially constant cross-section with the exception of the holes 22 drilled therethrough (see below) for the bolt fixing means 24.

10 Referring to Figure 7 of the drawings that follow, a method of assembly of part of a space frame is described.

To assemble the column beam 6 to the rafter beam 8, in step 100 the square ends of each are mitred to the
15 required angle for mutual alignment. In step 101 the end plate is mitred to the required angle, here approximately 30° so it can be inserted in the end of rafter column 8 and its end lie flush therewith. In step 102 bolts 34 are inserted into the holes 22 in the end thereof and holding
20 plate 40 is slid into slots 28 to prevent the bolts 34 from falling out subsequently. Recesses 26 hold the heads of bolt 34 captive so that they can be secured (see below). In step 104 end plate 14 is inserted into the otherwise open end of rafter beam 8 and is a sliding fit
25 therein. The end plate 14 is inserted until its end 20 is aligned and flush with the end of rafter beam 8. In step 106 holes are drilled in both side walls of rafter beam 8 and therefore through limbs 16, 18. In step 108 bolts 34 are passed through each of the holes from the exterior of
30 one side wall of rafter beam 8 and through the rafter beam 8 to the exterior of the other side wall thereof and secured with corresponding nuts.

In step 110 holes aligned with bolts 34 are drilled in a side wall of column beam 6 to which the rafter beam is to be attached. In step 112 the bolts 34 are inserted through the holes in column beam, nuts applied and
5 tightened through the open upper end of column beam 6.

The exposed bolt ends may be covered with cappings to obscure these from view and other aesthetic additions can be made (step 114).

10

It will be appreciated by those skilled in the art that by having the first (column) and second (rafter) beams 6, 8 effectively clamped together rather than simply being secured relative to a steel plate the whole structure
15 moves when stressed thus spreading the load better.

It will be appreciated by those skilled in the art that the method of assembly described above can be carried out in a variety of different orders.

20

Referring to Figure 8 of the drawings that follow there is shown a hip connection to an eaves beam comprising a column beam 60 of rectangular cross-section to three sides of which beams 62 and 66, as well as rafter beam 64, are
25 attached using end plates 14 in the manner described above.

For fixing a first beam end to end to a second beam a similar end plate 14 can be used, or alternatively a
30 simple blank ended end plate 70, shown in Figure 10 of the drawings that follow, can be used as is shown in cross-section in Figure 9 of the drawings that follow. The end plate 70 just needs to provide a wall 72 for bolts to abut

against and limbs 74, 76 to secure the end plate 70 to the respective beam.

Use of the system described herein minimises the need for
5 welding. The system can, advantageously, be delivered as a flat-pack.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to
10 this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

15 All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features
20 and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same,
25 equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

30 The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any

accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A structural support system for a conservatory structure, the structural support system comprising a first beam, a second beam attached to the first beam by an end thereof and an end plate at least partly closing the end of the second beam, with fixing means securing the first beam to the second beam through the end plate thereby to clamp the first beam to the second beam.
2. A structural support system according to claim 1, in which the end plate comprises means for holding at least one bolt head captive on the interior thereof.
3. A structural support system according to claim 2, in which the means for holding the at least one bolt head captive comprises a slot for receiving a bolt head.
4. A structural support system according to any preceding claim, in which the end plate comprises means for retaining at least one bolt in a hole through the end plate.
5. A structural support system according to any preceding claim, in which the means for retaining at least one bolt comprises a holding plate in a slot in the end plate.
6. A structural support system according to any preceding claim, in which the end plate is of generally U-shaped cross section.

7. A structural support system according to any preceding claim, in which the end plate has an end, a first limb depending therefrom and a second limb depending therefrom.

5

8. A structural support system according to claim 7, in which the first and second limbs are substantially parallel.

10 9. A structural support system according to any preceding claim, in which the end plate lies substantially within the second beam.

15 10. A structural support system according to any preceding claim, in which the end plate is dimensioned to be a sliding fit in a structural support beam.

20 11. A structural support system according to any preceding claim, in which an end of the second beam is attached to a side of the first beam.

25 12. A structural support system according to claim 1-10, in which an end of the second beam is attached to an end of the first beam.

13. A structural support system according to any preceding claim, in which the end of the second beam is mitred to fit to the first beam at a desired angle.

30 14. A structural support system according to any preceding claim, in which the first beam is a column beam and the second beam is a rafter beam.

15. A conservatory structure comprising a structural support system at least part of which is according to any preceding claim.
- 5 16. A method of assembly of at least part of a structural support system, the method comprising the steps of providing a first beam, providing an end plate at the end of a second beam at least partly closing the end of the second plate and securing the first and second
10 beams together via the end plate thereby to clamp the first beam to the second beam.
17. A method of assembly according to claim 16, in which the structural support system is according to any one
15 of claims 1-14.
18. A method of assembly according to claim 16 or claim 17, in which a conservatory element is applied to the structural support system.

1/9

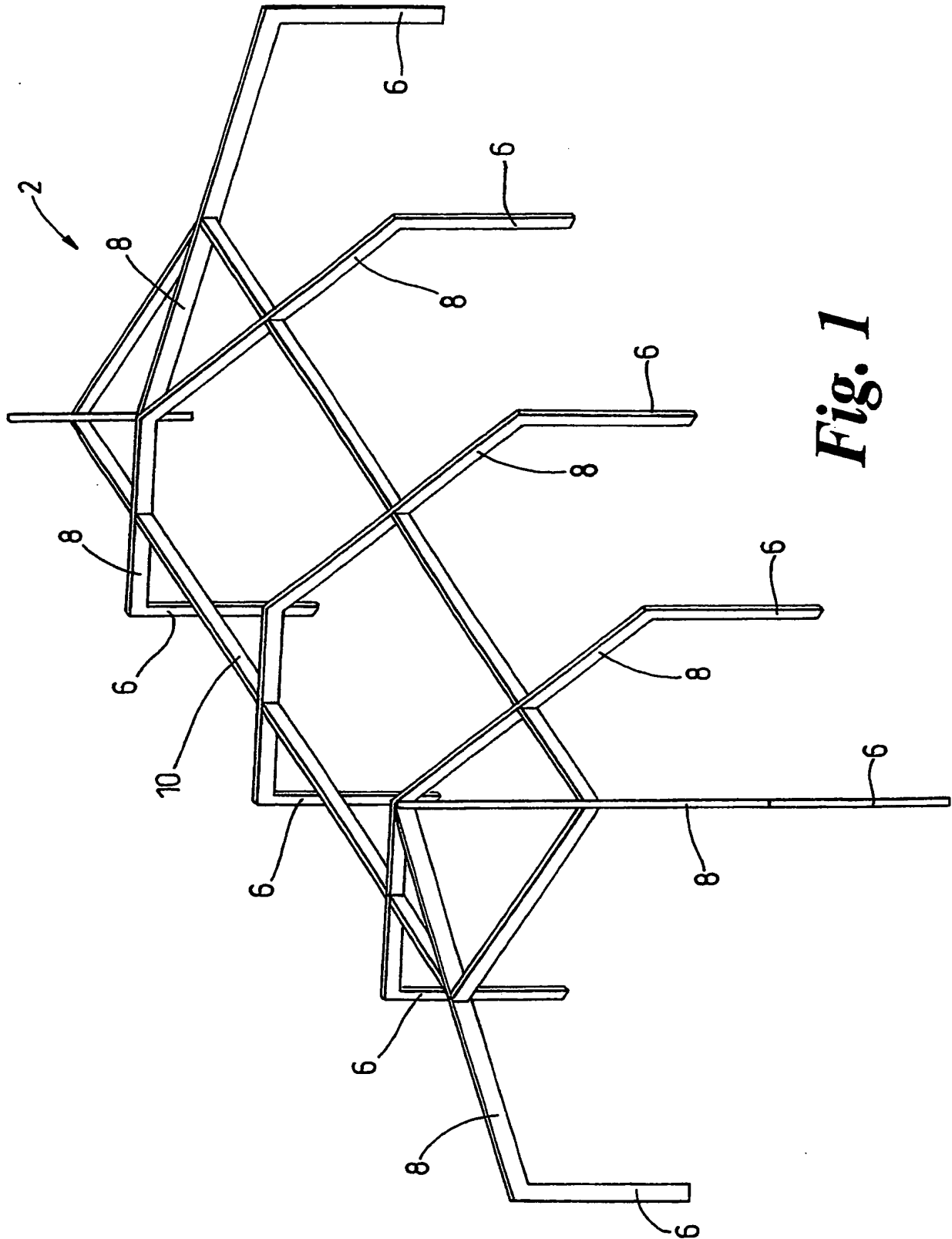


Fig. 1

2/9

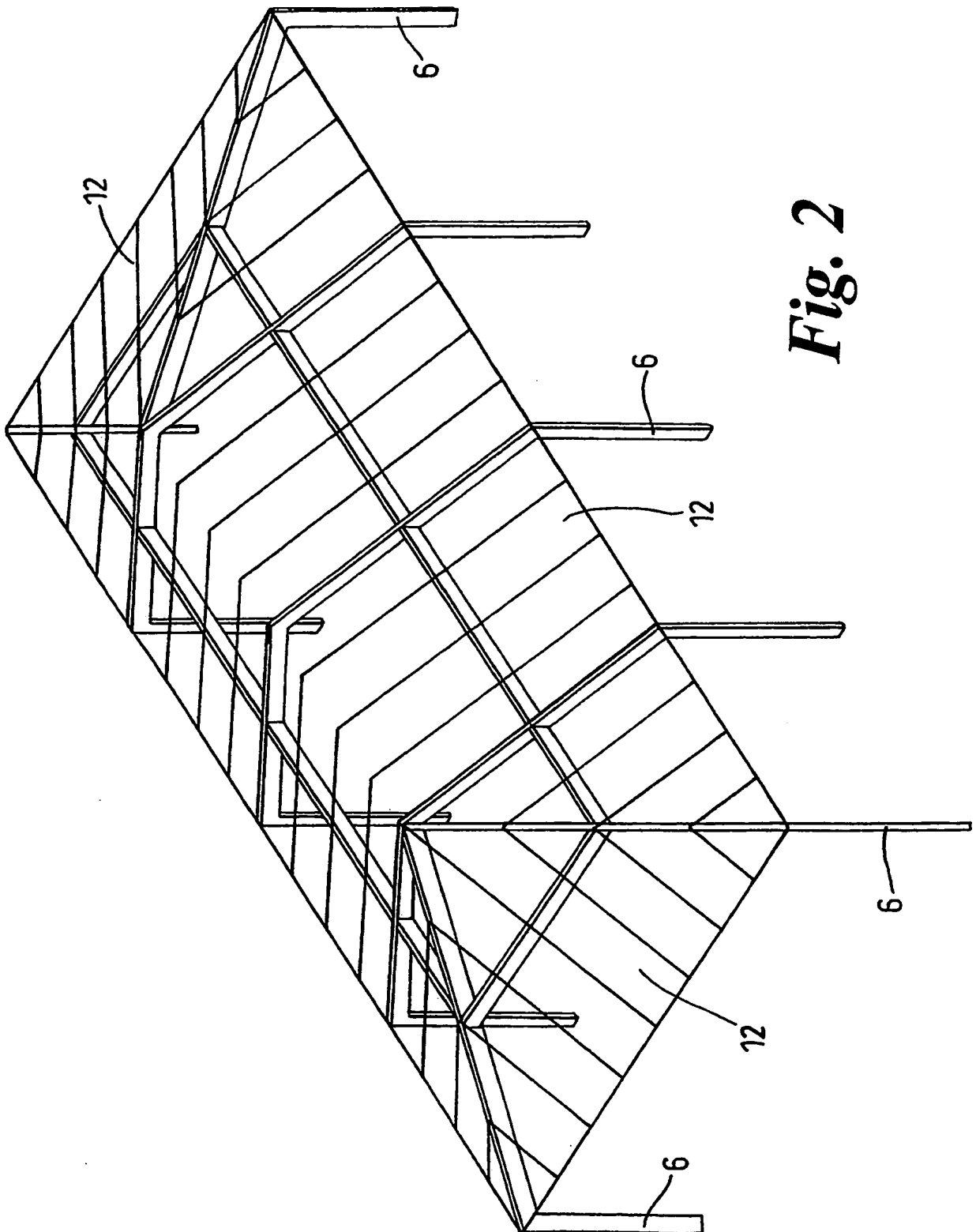
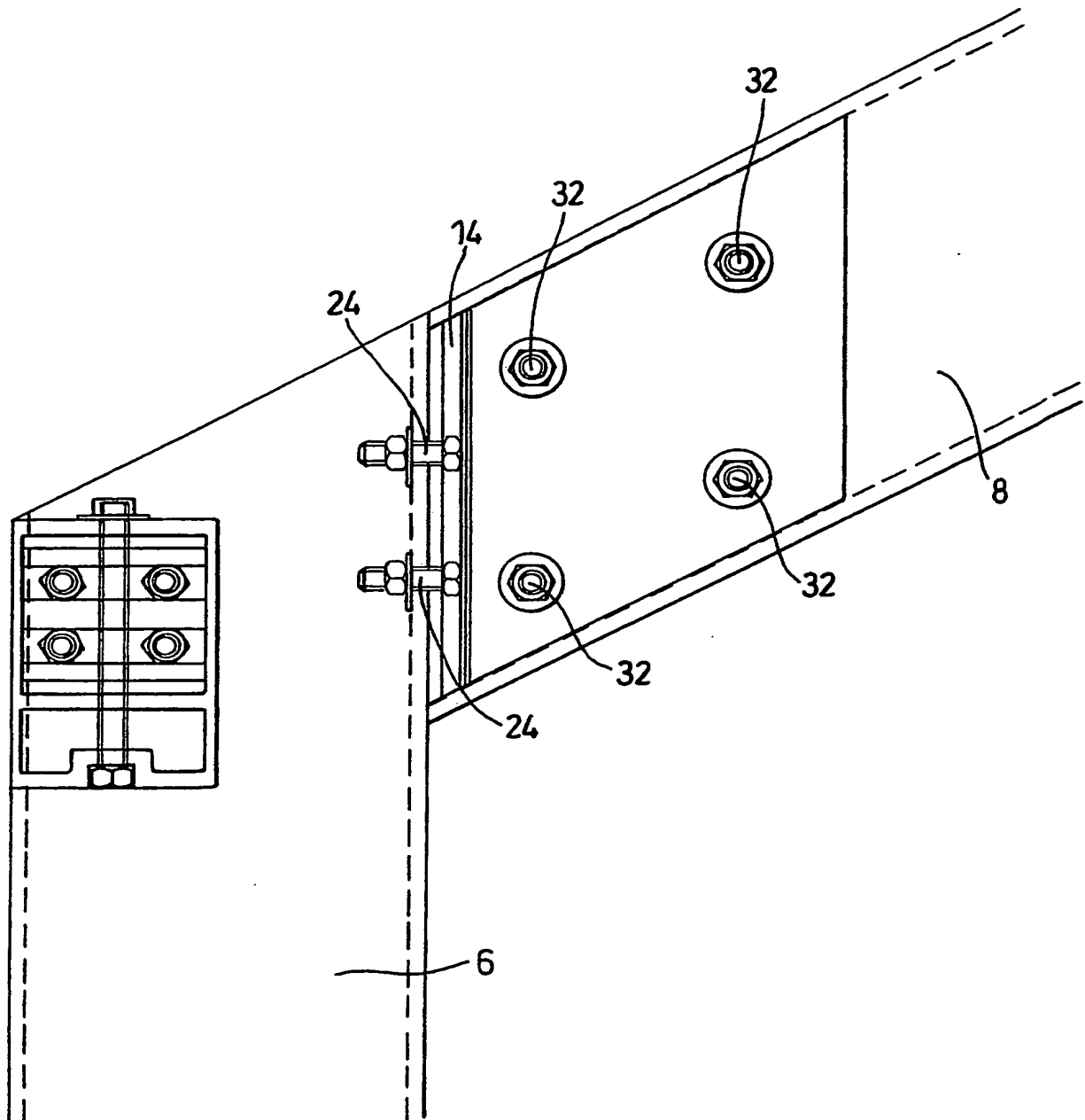


Fig. 2

3/9

**Fig. 3**

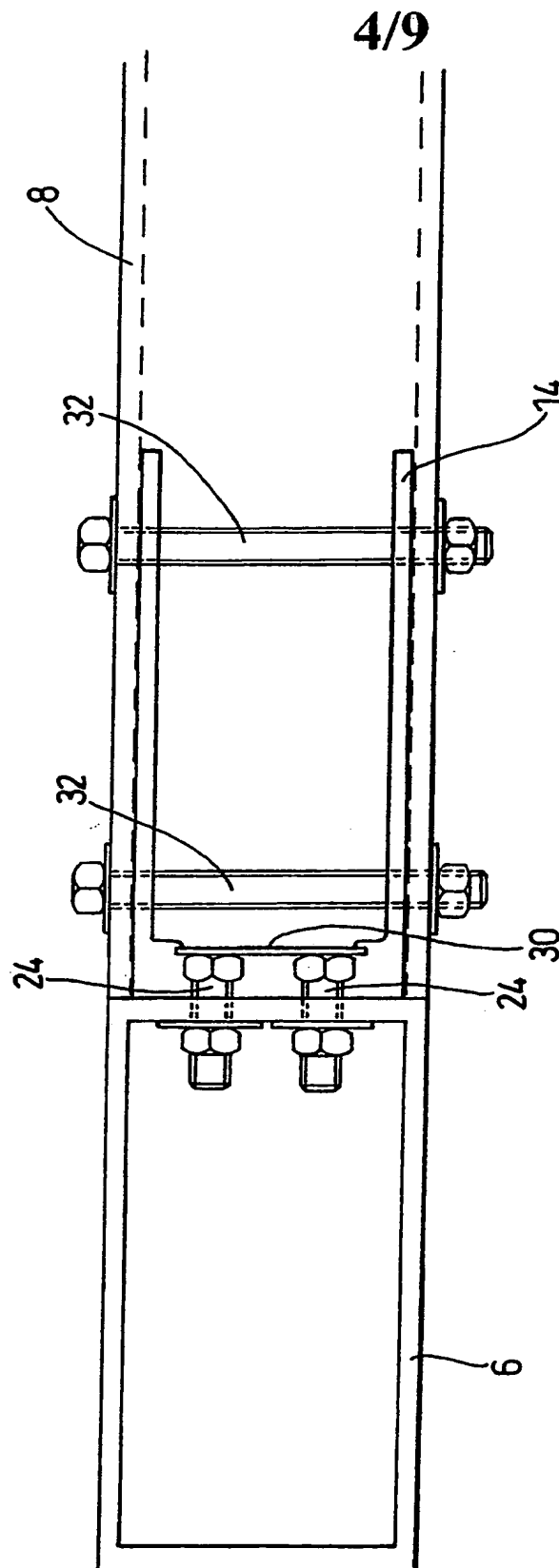


Fig. 4

5/9

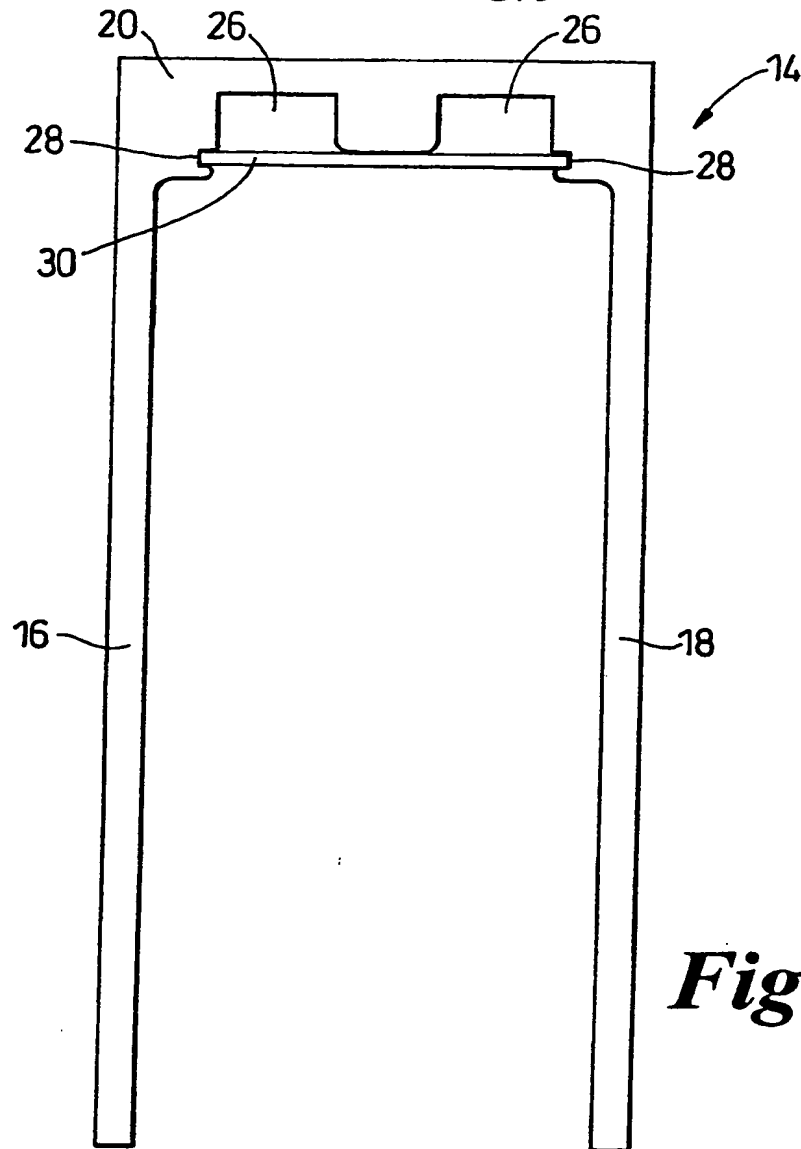


Fig. 5

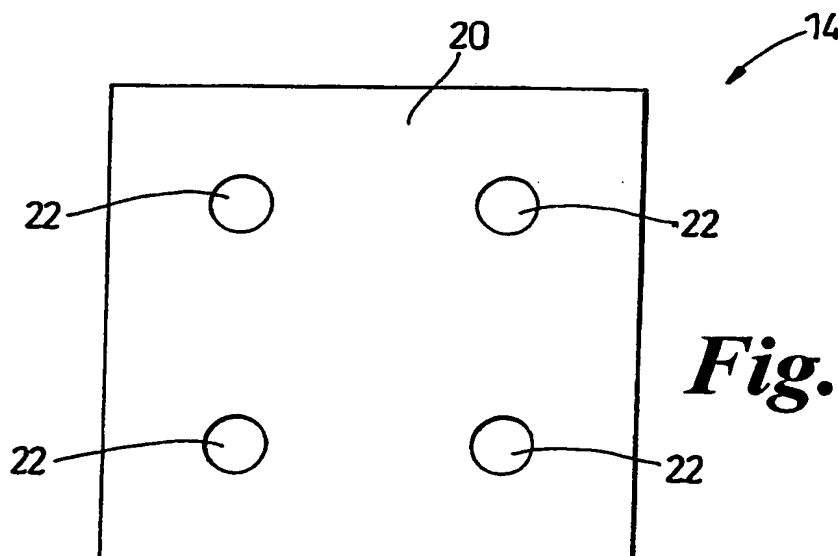
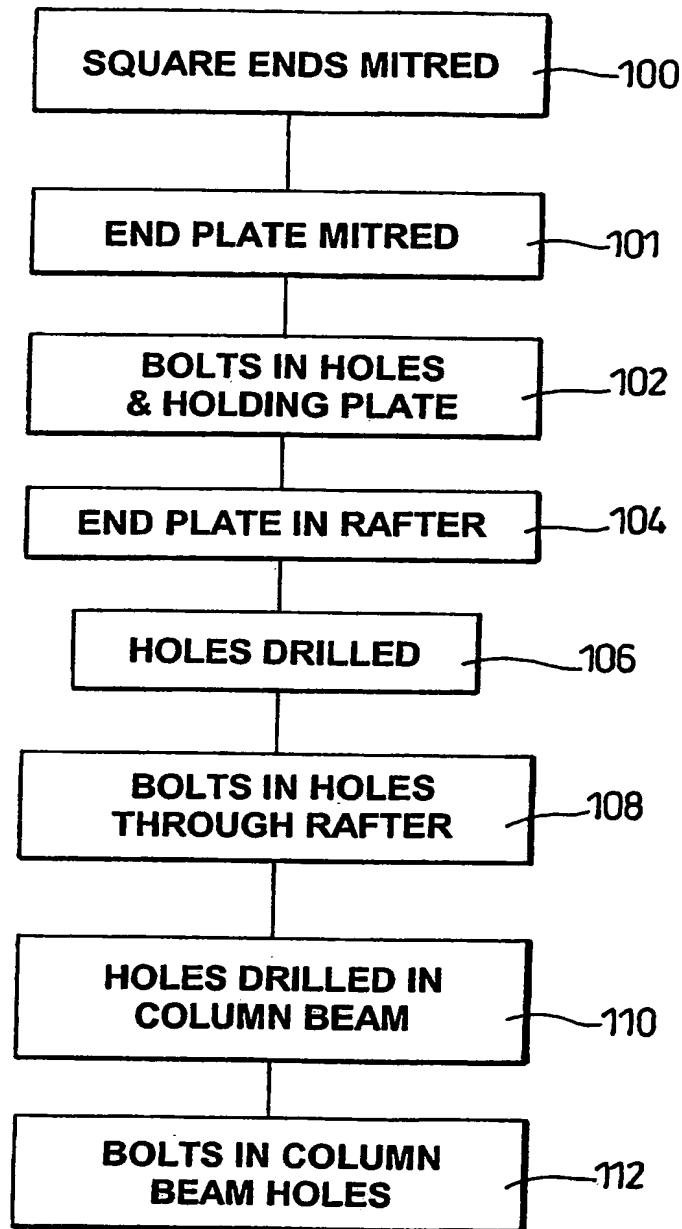
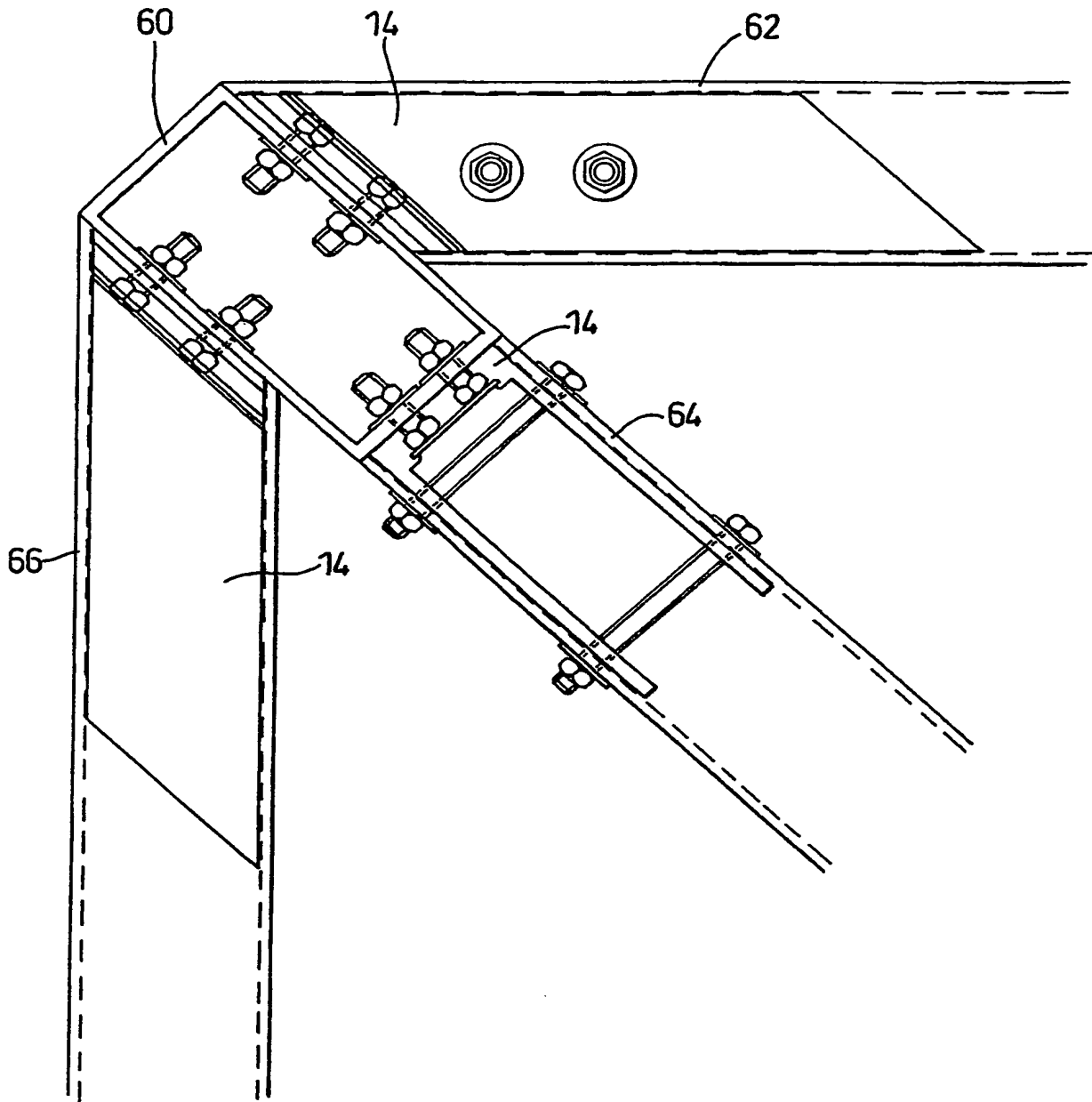


Fig. 6

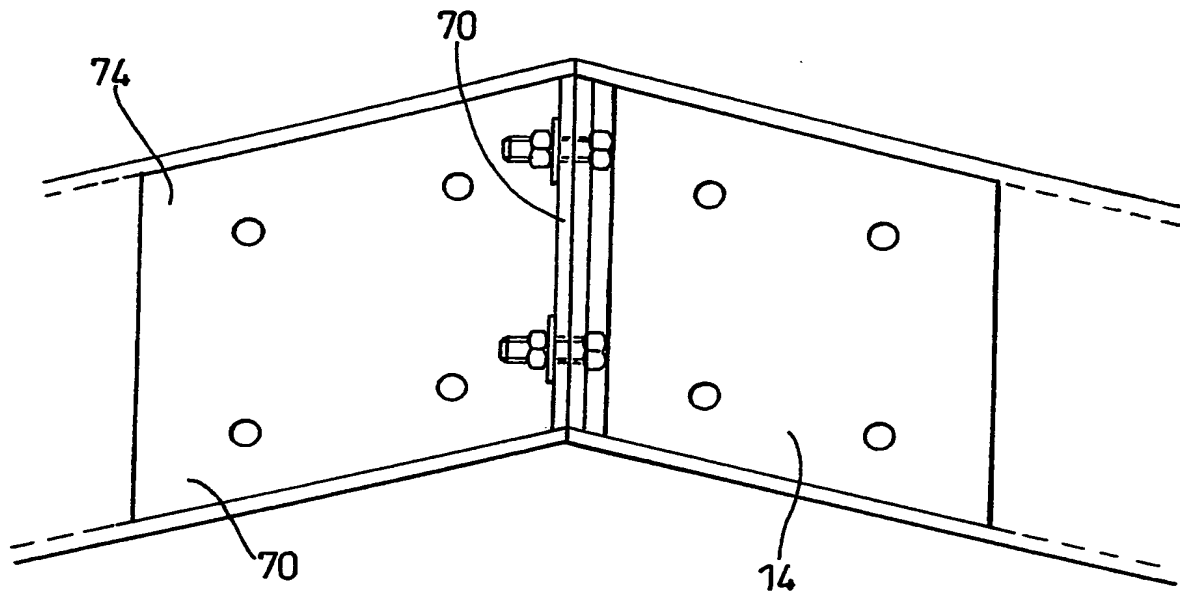
6/9

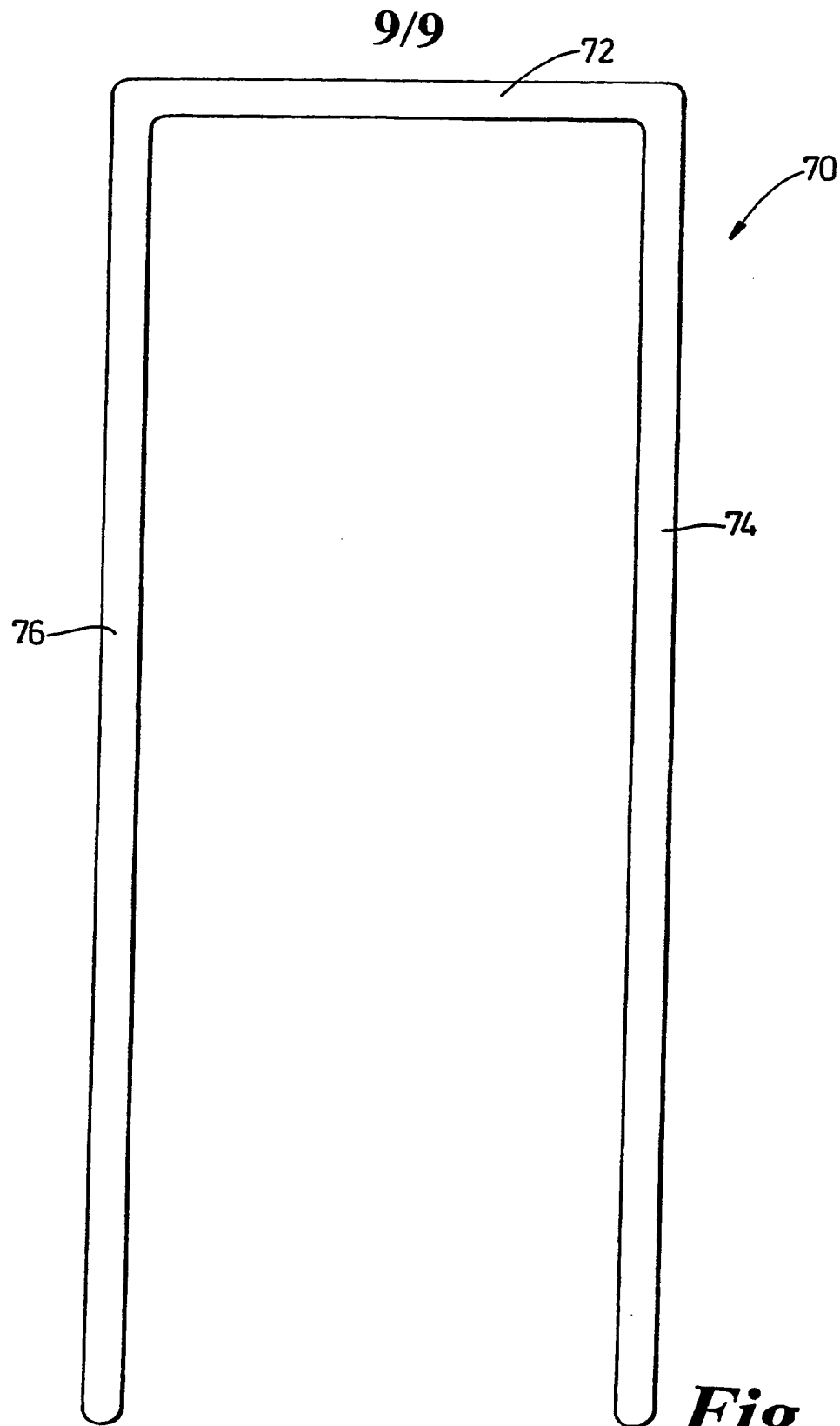
*Fig. 7*

7/9

***Fig. 8***

8/9

***Fig. 9***

***Fig. 10***